DECLARATION OF LUDO ADRIAENSEN

I, Ludo Adriaensen, a citizen of Belgium, residing at Bottenhoek 15, 8540 Deerlijk, Belgium, declare and state that:

1. I graduated from the Catholic University of Leuven, Belgium (Katholieke Universiteit Leuven, Belgium) with a Ph.D. in Polymer Chemistry in 1970.

2. From 1970 to 2004, I worked for N.V. Bekaert S.A. as a researcher, research director, marketing and sales manager and product and business development manager at N.V. Bekaert S.A (the assignee of U.S. Patent Application Serial Number 09/890,408, the application currently under examination). I am currently retired.

3. I am a named inventor of the U.S. patent application identified in the caption of this declaration. The U.S. patent application identified in the caption is assigned to N.V. Bekaert S.A., my former employer. I am a named inventor on at least seven U.S. patents and at least four pending U.S. patent applications. Most of these patents /applications relate to improvements of and/or to the use of wires, cables, metals and polymer plastics, particularly for composite structures. The first of my U.S. patents was filed more than 22 years ago. In other countries in the world, I am a named inventor on more than twenty distinct inventions. Most of these patents / patent applications relate to improvements of and/or to the use of wires, cables, metals and polymer plastics, particularly for composite structures.

4. I am familiar with the literature on canvas in general and reinforced canvas in particular and methods for making canvas / reinforced canvas. I am familiar with the literature on utilizing metal wires and cords for reinforcement of flexible blanket-like (planar) material (*e.g.*, canvases), and with the literature on coating metal wires and cords with thermoplastic material, and apparatuses and methods for producing reinforced canvas and metal wires and cords and apparatuses and methods for coating metal wires and cords with thermoplastic material. I understand how a person of ordinary skill (*e.g.*, someone with a degree in an engineering discipline such as mechanical engineering or the like, someone not having a formal

advanced education but having a considerable number of years working as an apprentice, etc.) working in the field of reinforced canvas and metal cables / cords for, about five years or more would understand the terms and concepts disclosed in the literature, including the patent literature.

5. I have reviewed the Examiner's office actions in this case, and I have reviewed the patent literature cited by the examiner, especially Adriaensen (WO 98/55682), which is presented herein at Tab A, Zheng (U.S. Patent No. 5,807,430), which is presented herein at Tab B, Czerwinski (U.S. Patent No. 4,308,365), which is presented herein at Tab C, and Daisel (JP 5216465), which is presented herein at Tab D.

6. Adriaensen, a patent application reflecting my prior efforts in the field of canvas reinforcement, accurately reflects my understanding at the time of filing of that application that all that was required to obtain a good adhesion between a metal element and the plastic coating coating of a canvass is applying a thermoplastic coating that is adherable to the plastic coating of the canvass on the metal element.

7. It was only after I developed the reinforced canvas taught in Adriaensen that I conceived of the idea of using a primer layer before the application of the thermoplastic material. I conceived of this idea as a remedy to some problems we discovered during implementation of my teachings (*i.e.*, those of Adriaensen). One of the problems that we discovered was that significant amounts of thermoplastic flow occurs away from the metal portion of the strips when the strips are welded to the canvas. As the material is flowing away, the metal elements are no longer protected against corrosion. To the best of my knowledge, I was the first to discover this problem. A second problem we discovered during implementation of my prior teachings was that a canvas utilizing strips comprising metal elements and a coating of a thermoplastic material (without using a primer layer) offered low resistance against sharp shear forces (such as accidental clipping by a scissor device).

8. It is my belief that at least as of March 1999, the ordinary artisan would not have used a primer coating on the wires in combination with my teachings in Adriaensen. This is because, among other reasons, I specifically taught away from such a coating. In Adriaensen, I specifically stated that the *lower* adhesion between the thermoplastic matrix and the wires provided improved resistance against cutting by a pair of shears: "the wires have a much

smoother surface and adhere mechanically not so well to the matrix material. With respect to the resistance against the action of a pair of shears, *this has been experienced more as an advantage than as a drawback.*" (Page 5 of Adriaensen, and I have emphasized some of the text.) It is therefore my belief that even if the ordinary artisan would have known to utilize a primer to enhance adhesion between a wire and a thermoplastic material, the ordinary artisan would not have considered modifying my teachings in Adriaensen to arrive at the invention as claimed, based at least on this excerpt from Adriaensen.

9. The ordinary artisan, at least as of March, 1999, for additional reasons, would not have considered applying a primer coating to a steel wire for use in a thermoplastic strip used for reinforcing canvas. First, for example, the ordinary artisan, not having knowledge of the problems we discovered, would have found it acceptable to simply utilize metal elements without a primer, as I found acceptable for a time after developing the technology presented in Adriaensen. Second, the ordinary artisan would have understood that adding an additional layer such as a primer layer to a metal element would have complicated the manufacturing process, would have increased the time necessary for the application of the coating and would have increased the costs.

10. One of ordinary skill in the art of canvas reinforcement / thermoplastic strips for reinforcement of canvas would not have looked to Zheng for teachings to incorporate into my prior efforts (*i.e.*, those of Adriaensen). As I have previously stated, the ordinary artisan, not having knowledge of the problems we discovered, would have been discouraged from using a primer on a wire due to the increased manufacturing costs associated with using a primer (despite the reduced costs of using a wire). In this regard, Zheng teaches that his coating must be heat-treated for 30-60 minutes before anything is attached to the primer. (Zheng, examples.) The ordinary artisan would have considered such a long heat-treat time as unacceptable for use in a continous coating process of elongated elements.

11. The ordinary artisan in the field of canvas reinforcement and plastic strips for use in canvas reinforcement would not have looked to Daisel for teachings to incorporate into my prior efforts (*i.e.*, those of Adriaensen) for a number of reasons. I first note that the ordinary artisan would have been discouraged from using wires primed wires in particular, as I detail above. Further, for example, Daisel is entirely directed towards use in the fishing line industry.

The ordinary artisan in the canvas arts would not have been motivated to look to the field of fishing for teachings to incorporate into canvas arts. Indeed, it did not occur to me to look to this field. Further, the primers taught by Daisel contain volatile organic compounds (VOCs). The ordinary artisan in the 1999-2000 timeframe would have viewed using a primer containing VOCs as increasing manufacturing costs and otherwise complicating the manufacturing process as it was well known at that time that VOCs are environmentally unfriendly compounds which must be handled with increased care. Thus, the ordinary artisan would not have considered utilizing the primers of Daisel as he had no knowledge of the problems we discovered and would have viewed such primers as increasing the cost of manufacturing reinforced canvas.

12. The ordinary artisan in the field of canvas reinforcement and plastic strips for use in canvas reinforcement would not have looked to the teachings of Czerwinski for teachings to incorporate into my prior efforts (*i.e.*, those of Adriaensen) for a number of reasons. As noted above, the ordinary artisan would not have tried to modify my teachings detailed in Adriaensen to utilize a wire with a primer in a plastic strip for canvas reinforcement – he or she would have been discouraged from doing so. Further, the ordinary artisan would not have been motivated to utilize Czerwinski's hot melt coating, as the ordinary artisan would have seen this as unnecessarily complicating the manufacturing process of the strips. (I note that I teach the use of hot melt in my U.S. Patent Application Serial Number 09/890,408. However, this teaching does not detract from the fact that the ordinary artisan would have tried to avoid using hot melt if possible. That is, I believe, that when forced to make the hypothetical decision to (i) follow my prior, apparently adequate, teachings (*i.e.*, those completely and adequately detailed in Adriaensen) regarding reinforcing a canvas using metal elements without need for a primer, or (ii) develop a new design for reinforcing a canvas by going out into uncharted territory (at that time – prior to my continuing efforts) and using plastic strips with steel wires having a coating embedded therein, the ordinary artisan would not have been motivated to work towards option "ii.")

13. I declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States

Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 3 April 2006 Name: 

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(71) Applicant *(for all designated States except US)*: N.V. BEKAERT S.A. [BE/BE]; Bekaertstraat 2, B–8550 Zwevegem (BE).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: ADRIAENSEN, Ludo [BE/BE]; Bottenhoek 14, B–8540 Deerlijk (BE). VANDEWALLE, Gerard [BE/BE]; Oliebergstraat 46, B–8540 Deerlijk (BE).

(74) Agents: MESSELY, Marc et al.; N.V. Bekaert S.A., Bekaertstraat 2, B–8550 Zwevegem (BE).

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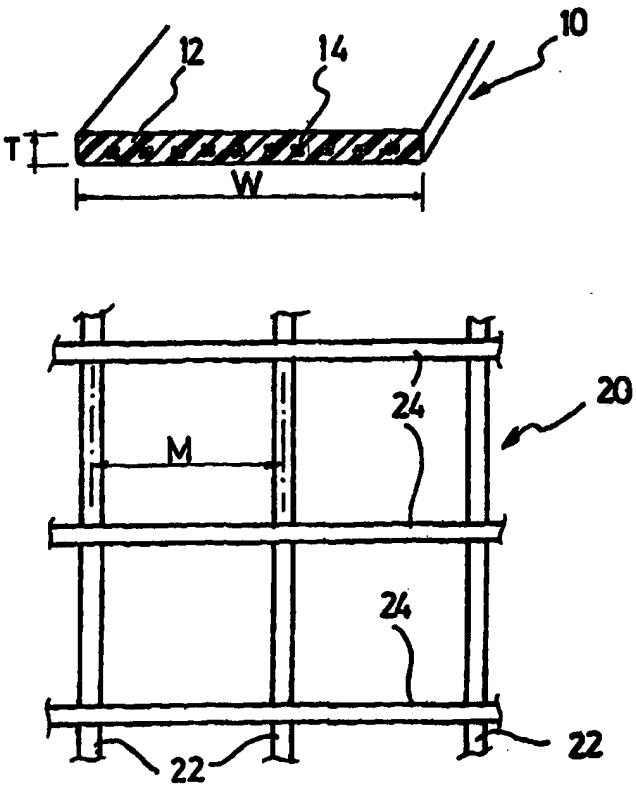
(57) Abstract

A fabric (20) for reinforcement of canvasses having a plastic coating. The fabric (20) comprises a warp (22) and a weft (24) which form meshes having a maximum dimension ranging from 5 cm to 25 cm. At least one of the warp or the weft is formed by a strip (10) which comprises a matrix of a thermoplastic material (12) which is adherable to the plastic coating of the canvasses. This strip further comprises two or more elongated metal members (14). This strip has a cross–sectional average thickness ranging from 0.50 mm to 3.0 mm and a cross–sectional width ranging from 3 mm to 25 mm. The strip and the fabric allow to reinforce the canvass in a cheaply way without adding too much additional weights.



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CANVASS REINFORCEMENT.

Field of the invention.

The present invention relates to a fabric and to a strip for reinforcement of canvasses having a plastic coating.

Background of the invention.

Canvasses or sail clothes having a plastic coating, e.g. on a textile tissue, are used as tent material and as material to cover and protect the cargo or loads on vehicles or containers.

A number of requirements are put on these canvasses.

A first requirement that the canvasses must give a sufficient protection against vandalism and robbery. Here it is postulated that a proper canvass should at least delay the action of an opportunist thief who acts by means of a knife or cutter or by means of a pair of shears. The delay should last a number of minutes.

A second requirement is that canvasses must prevent the load from uncontrolled horizontal movements without tearing.

A third requirement is that initial cracks in canvasses must be prevented from growing.

A fourth requirement is that canvasses together with their reinforcement must have a weight which is as low as possible.

The prior art has already provided a solution which meets three of the above-mentioned requirements. Such a prior art canvass is reinforced by means of a woven fabric of stainless steel wires or cords.

Following drawbacks, however, are discovered with such prior art canvasses.

First of all such canvasses are very expensive due to the high price of the stainless steel fabric and to the expensive way of

manufacturing such a canvass.
Secondly, the stainless steel fabric increases the weight of the canvass to an unacceptable degree so that the above-mentioned fourth requirement is not met.
And thirdly, the stainless steel fabric negatively influences the appearance or outlook of the canvass and as a result any publicity or brand names are no longer clearly pronounced on the canvass.
Aramid reinforcements may provide a solution to the first and third drawback but remain expensive and they do not give a sufficient resistance against the action of a cutter or a knife.

Summary of the invention.

It is a general object of the present invention to avoid the drawbacks of the prior art.
It is a first object of the present invention to provide for a low-cost reinforcement for canvasses.
It is a second object of the present invention to provide for a reinforcement for canvasses with an acceptable weight.
It is a third object of the present invention to provide for a reinforcement of canvasses which minimizes the influences on the appearance or outlook of canvasses.

According to one aspect of the present invention there is provided a fabric for reinforcement of canvasses having a plastic coating.
The fabric comprises a warp and a weft which form meshes.
These meshes have a maximum dimension ranging from 5 cm to 30 cm, preferably from 5 cm to 25 cm. Most preferably this maximum dimension is adapted to the kind of goods to be protected, but the most suitable dimension of these meshes is preferably about 7 cm to 15 cm, for example about 8 cm to 12 cm,

in order to slow down the action of a thief which tries to penetrate his fist into such a mesh in order to take away goods.

At least one of the warp or the weft (but preferably both the warp and the weft) is (are) formed by a strip which comprises a matrix of a thermoplastic material which is adherable to the plastic coating of the canvasses.

The strip further comprises two or more elongated metal members, preferably located parallel in the plane of the strip, in order to provide sufficient resistance against the cutting action of a knife or against the action of a pair of shears. The plurality of elongated metal members give to the strip the required strength and simultaneously enable the strip to remain thin and flexible.

The strip has a cross-section with at least one flat side and an average thickness ranging from 0.50 mm to 3.0 mm, preferably ranging from 0.50 mm to 2.00 mm, and a cross-sectional width ranging from 3 mm to 25 mm, e.g. ranging from 5 mm to 25 mm. This flat cross-section enables the strip to remain thin whilst simultaneously providing a sufficient surface for adhesion between the canvass and the fabric.

The strips forming the warp may be connected to the strips forming the weft by means of an adhesive or by means of a welding technique where it is not necessary that the elongated metal members are welded to each other : it is sufficient that the connection is made by means of the thermoplastic material alone. The welding or at least contacting of one or more metal members of the warp to one or more metal members of the weft is, however, not excluded. This has the drawback that the welding is more expensive, but has the advantages that the final fabric is much

stronger and that the fabric can be used as electrical circuits which may provide additional security.

According to one embodiment of the fabric the strips forming the weft lie above the strips forming the warp (or vice versa). Adhering such a fabric to a canvass leads to a canvass which is relatively flexible in the direction of the strips (warp or weft) that are adhered to the canvass over their complete length and relatively stiff in the direction of the strips (weft or warp) that are not adhered to the canvass at the points of crossing with the other strips.

According to another embodiment of the fabric the strips forming the weft lie alternatingly under and above the strips forming the warp. Adhering such a fabric to a canvass leads to a canvass which is equally flexible in both the warp and weft direction.

The functionality and flexibility of a fabric may also be influenced by the type of metal members used to reinforce the strips. High carbon steel cords (carbon content above 0.7 %) have the advantage of being relatively flexible, of having a high strength and of adhering mechanically well to the matrix material of the strip due to their undulated outer surface. They provide a good remedy against the action of a knife or a cutter. The steel cord may have a high elongation at break, e.g. an elongation at break exceeding 5 %, so that much energy can be absorbed before the steel cord breaks.
In a particular embodiment of the invention the steel cord has two or more twist angles which differ substantially from each other.

Substantially differing twisting angles has the advantage of offering an improved resistance against stabs.
Preferably the steel cord is free of residual torsions and of other tensions in order to avoid that the steel cord would become wild when the strip is welded under heat to the canvass.

The inventors have experienced, however, that metal members which are more ductile than high carbon steel cords provide an improved resistance against the action of a pair of shears or a pair of scissors and that this resistance is even increased if the ductile member does not adhere to the matrix material. Examples of ductile members are a copper wire, which has the advantage of being very suitable for use in an electrical circuit or a low carbon steel wire (carbon content below 0.4 %) which can be thermally treated to further increase its ductility. The steel wire can be a round steel wire or a flat steel wire.
In comparison with steel cords, the wires have a much smoother surface and adhere mechanically not so well to the matrix material. With respect to the resistance against the action of a pair of shears, this has been experienced more as an advantage than as a drawback.
The copper or steel wires are, however, less flexible than steel cords but for equal strengths a steel wire is less expensive but less flexible.

Canvasses for trucks may be divided into two main categories : canvasses of the curtain type and canvasses of the roll up type. Canvasses of the curtain type are slidingly suspended on horizontal rails and can be horizontally slid to one side to open the canvass. Canvasses of the curtain type require flexibility in the

horizontal direction.

Canvasses of the roll up type can be rolled up vertically to open the canvass. Canvasses of the roll up type require a flexibility in the vertical direction.

Fabrics according to the invention may be realized so that there are strips reinforced with flexible metal members such as steel cords in one direction (the horizontal for canvasses of the curtain type and the vertical for canvasses of the roll up type) and strips reinforced with ductile but less flexible metal members such as metal wires in the other direction.

Various types of metal members can also be combined in a single strip so that the single strip offers both a good resistance against the action of a knife or a cutter and a good resistance against the action of a pair of shears.

According to a second aspect of the present invention, there is provided a strip for reinforcement of canvasses having a plastic coating. The strip comprises a matrix of a thermoplastic material which is adherable to the plastic coating of the canvasses. The strip further comprises two or more elongated metal members. The strip has a cross-section with at least one flat side and with an average thickness ranging from 0.50 mm to 3.0 mm (preferably to 2.0 mm) and a cross-sectional width ranging from 3 mm to 25 mm.

The thermoplastic material is preferably of the same nature or preferably has a similar composition as the plastic coating of the canvass. Canvasses are usually made of a flexible polyvinyl-

chloride but may also be made of a flexible polypropylene or polyethylene or even of polyester.

Preferably four to twenty metal members reinforce one single strip.

In order to obtain a strip which is flat and remains flat, single-twisted cords may function as metal members where a Z-twisted cord alternates with an S-twisted cord and vice versa along the width of the cross-section of the strip.

The breaking load of all the metal members in one single strip is preferably higher than 2000 Newton.

Brief description of the drawings.

The invention will now be described into more detail with reference to the accompanying drawings wherein

- FIGURE 1 and FIGURE 2 show two strips according to the second aspect of the present invention ;
- FIGURE 3 and FIGURE 4 show two fabrics according to the first aspect of the present invention ;
- FIGURE 5 schematically illustrates a way of manufacturing a strip according to the first aspect of the present invention.

Description of the preferred embodiments of the invention.

Figure 1 shows a strip 10 according to the second aspect of the present invention. The strip 10 comprises polyvinylchloride as matrix material 12 and ten parallel steel cords 14 of the type 4x0.175, i.e. a steel cord consisting of four filaments with each a diameter of 0.175 mm. The twisting pitch of the steel cord is 10 mm. The width W of the strip is equal to 9.0 mm and the thickness T of the strip is only 0.80 mm.

The outer left and the outer right steel cords 14 can be omitted in order to have sufficient matrix material left at the edges after the welding of the strips to each other. Otherwise the outer left and outer right metal members could come free, i.e. no longer surrounded by matrix material after the welding operation.

Obviously other type of steel cords may also be used such as a 2x0.30, a 3x0.20, a 3x0.25, a (2+2)x0.175, a 5x0.150, or a 3x2x0.22 steel cord.

Single metal wires such as a round steel wire with a diameter of about 0.50 mm or a flat steel wire of about 0.70 mm x 0.30 mm or of about 1.90 mm x 0.58 mm are also suitable as reinforcements. The steel cords are preferably free of residual torsions and of tensions. The latter may be accomplished by applying a stress-relieving treatment to the steel cord after the twisting operation.

FIGURE 2 shows another strip 10 which is somewhat thicker. The average thickness here is 1.20 mm and the width is 10 mm. The reinforcing cords 14' and 14" are 2x0.30 steel cords, which mean that they consist of two single filaments with a filament diameter of 0.30 mm. A Z-twisted steel cord 14' alternates with an S-twisted steel cord 14" along the width of the strip 10. A higher pressure has been applied during the extrusion of the strip, which has resulted in indentations or thickenings 16 at the level between the steel cords 14', 14".

Obviously suitable tools such as dies or combs may be provided to avoids these indentations or to make indentations just at the level of the steel cords 14', 14" instead of between the steel cords 14', 14".

FIGURE 3 shows an embodiment of a fabric 20 according to the first aspect of the present invention. The fabric 20 comprises strips 22 forming the warp and strips 24 forming the weft lying above the strips 22. Strips 22 and strips 24 are welded to each other. The width M of the mesh (measured between the center lines of two adjacent parallel strips) is 10 cm.
Welding strips 22 forming the warp over their whole length to a canvass so that the equally reinforced strips 24 forming the weft are only welded to the canvass for the part between the crossing points, leads to a canvass which is relatively flexible in the direction of the strips 22 forming the warp and relatively stiff in the direction of the strips 24 forming the weft.
Such a reinforced canvass with a 'flexible direction' and a 'stiff direction' are suitable for reinforcement of canvasses of the curtain type and of canvasses of the roll up type.

FIGURE 4 shows an embodiment of a fabric 20 which provides an equal flexibility to the canvass in both directions (on condition that the strips 22 and the strips 24 are equally reinforced). This is obtained by having the strips 22 forming the warp running alternatingly over and under the strips 24 forming the weft.
Such a reinforced canvass may be properly used as tent material.

FIGURE 5 schematically shows a method of manufacturing a strip according to the second aspect of the present invention. Steel cords 14 are wound from spools (not shown) and led via positioning and guiding means 26 and 28 to the entrance 30 of an extrusion apparatus. The matrix material, e.g. polyvinylchloride, is provided to the extrusion apparatus in the form of granules 32

made of a compound of flexible polyvinylchloride by means of a funnel 34.

The thus extruded strips can be welded together to form a reinforcing fabric according to the first aspect of the invention. Experiments have shown that if the welding is done under pressure of 20 à 30 Pa at a temperature of 125 °C and during 3 minutes, that the polyvinylchloride was flowing away at the edges and that metal members could come free, i.e. no longer surrounded by polyvinylchloride. By decreasing the welding time to 1 minute, a good weld was obtained without loss of polyvinylchloride material at the edges.

In comparison with a prior art stainless steel fabric, a fabric according to the first aspect of the present invention :

a) is a low cost fabric since the composing strips can be manufactured by extrusion, and the strips can be easily adhered to each other ; complex weaving can be avoided ;
b) enables an easy adherence to the canvass ; adherence to existing canvasses is also possible ;
c) has a lower weight ; as a matter of example, a fabric with a mesh width of 10 cm gives an additional weight of only 30 kg to 60 kg (depending upon the thickness and width of the strip) to a canvass for one truck ;
d) does not negatively influence the appearance or outlook of a canvass if the fabric is attached to the inner side of the canvass ; the outer side of the canvass can still be painted in any color or be provided with any publicity.

CLAIMS

1. A fabric (20) for reinforcement of canvasses having a plastic coating, said fabric comprising a warp (22) and a weft (24) which form meshes, said meshes having a maximum dimension ranging from 5 cm to 30 cm, at least one of the warp or the weft being formed by a strip (10) which comprises a matrix of a thermoplastic material (16) which is adherable to the plastic coating of the canvasses, said strip further comprising two or more elongated metal members (14), said strip having a cross-sectional average thickness ranging from 0.50 mm to 3.0 mm and a cross-sectional width ranging from 3 mm to 25 mm.

2. A fabric according to claim 1
wherein both the warp and the weft are formed by said strip.

3. A fabric according to claim 1 or claim 2
wherein the strips forming the weft lie above the strips forming the warp (or vice versa).

4. A fabric according to claim 1 or claim 2
wherein the strips forming the weft lie alternatingly under and above the strips forming the warp.

5. A fabric according to claim 1
wherein the strips forming the weft each comprise two or more elongated round metal members and the strips forming the warp each comprise an elongated flat metal member.

6. A strip (10) for reinforcement of canvasses having a plastic coating, said strip comprising a matrix (16) of a thermoplastic material which is adherable to the plastic coating of the canvasses, said strip further comprising two or more elongated metal members (14), said strip having a cross-sectional average thickness ranging from 0.50 mm to 3.0 mm and a cross-sectional width ranging from 5 mm to 25 mm.

7. A strip according to claim 6 wherein said thermoplastic material is polyvinylchloride.

8. A strip according to claim 6 wherein said thermoplastic material is a flexible polyvinyl-chloride compound.

9. A strip according to any one of claims 6 to 8 wherein said metal member is a steel cord (14).

10. A strip according to claim 9 wherein said steel cord has an elongation at break of at least 5 %.

11. A strip according to claim 9 or 10 wherein said steel cord is a single-twisted steel cord and wherein a Z-twisted steel cord alternates with an S-twisted steel cord along the width of the cross-section of the strip.

12. A strip according to any one of claims 9 to 11 wherein said steel cord is free of residual torsions.

13. A strip according to any one of claims 6 to 12 wherein the breaking load of all said metal members is at least 2000 Newton.

14. A strip according to any one of claims 6 to 8 wherein said metal member is a member which is more ductile than a high carbon steel cord.

15. A strip according to claim 14 wherein said ductile member is a copper wire or a copper cord.

16. A strip according to claim 14 wherein said ductile member is a low carbon steel wire.

17. A strip according to any one of claims 6 to 16 wherein said strip has a transversal cross-section which exhibits indentations at the level between the metal members.

18. A strip according to any one of claims 6 to 17 wherein the number of metal members ranges from 4 to 20.

19. Use of a fabric (20) according to any one of claims 1 to 5 for reinforcement of a canvass.

20. Use of a strip (10) according to any one of claims 6 to 18 for reinforcement of a canvass.

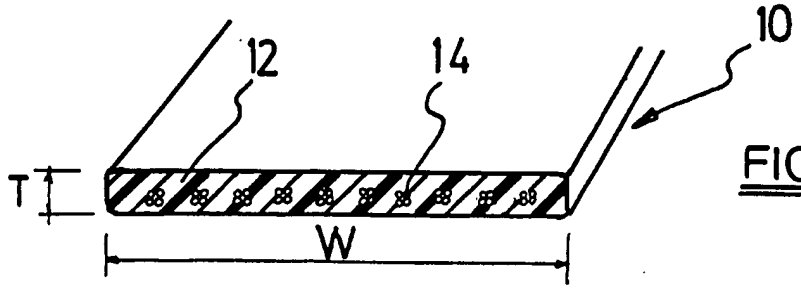


FIG.1

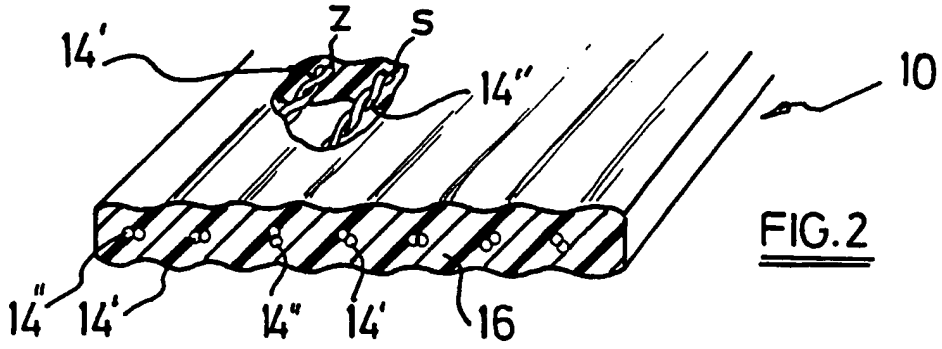


FIG.2

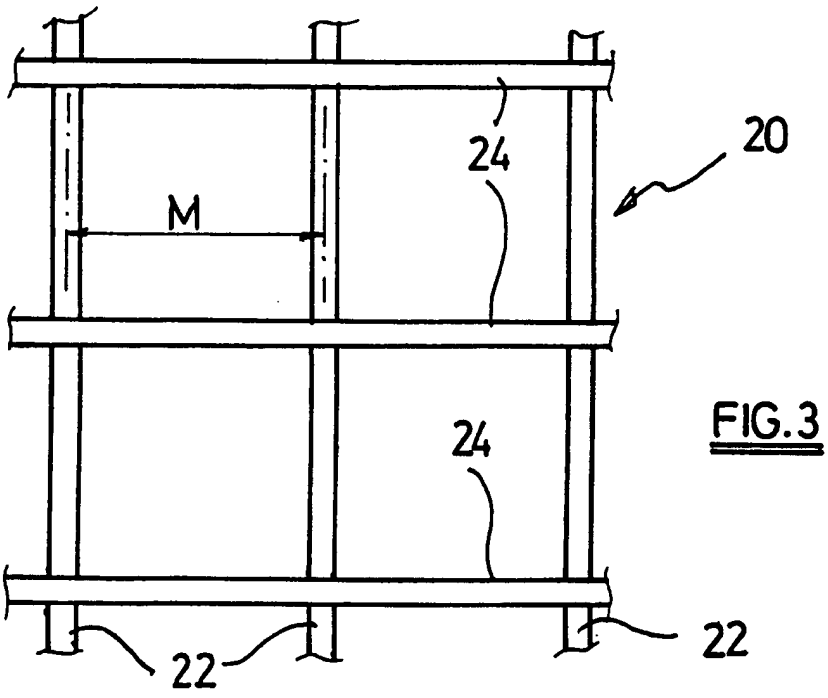


FIG.3

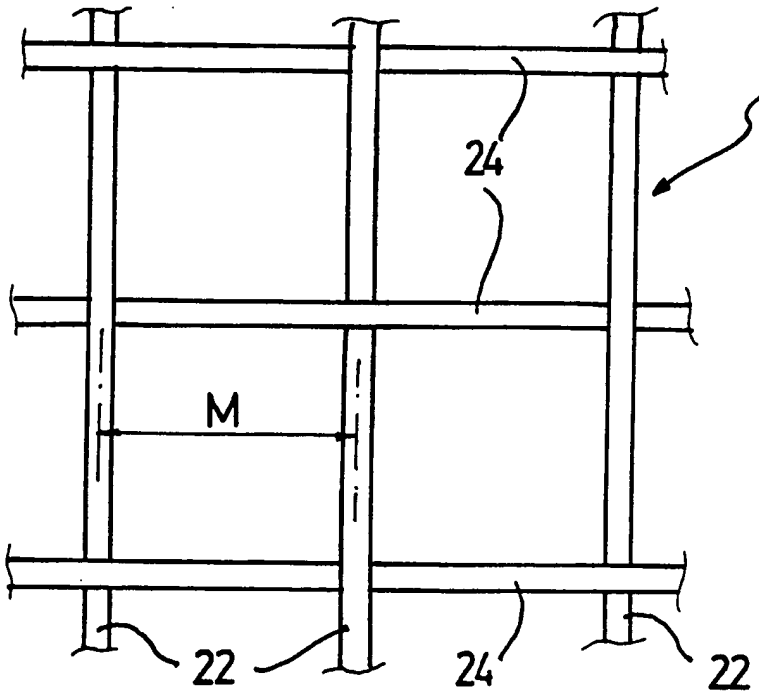


FIG.4

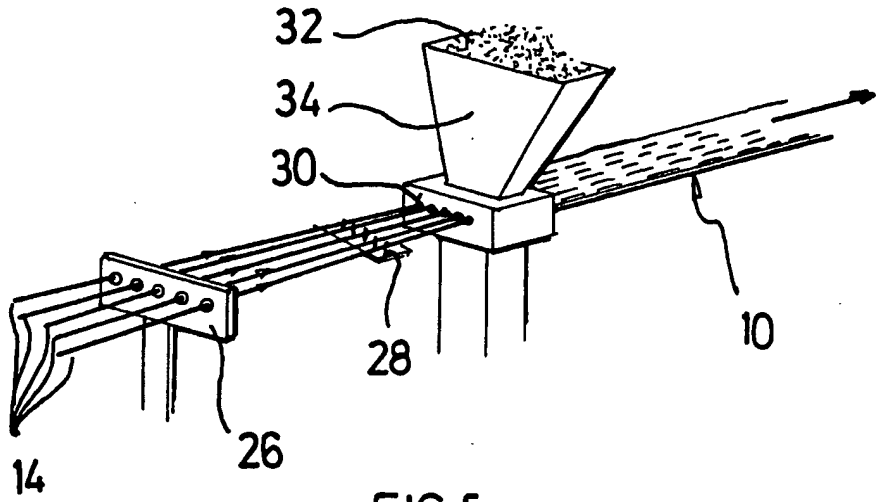


FIG.5

INTERNATIONAL SEARCH REPORT

Intern al Application No
PCT/EP 98/02980

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 D06N7/00 D06N3/00 D04H3/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 D06N D04H E04H B60P B32B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 441 719 A (TISSUS TECH DE TREVOUX) 14 August 1991 see claims ---	1
A	EP 0 174 792 A (TEIJIN LTD) 19 March 1986 see page 1, line 1 - line 7; claims -----	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publicationdate of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of theinternational search	Date of mailing of the international search report
28 August 1998	11/09/1998

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Pamies Olle, S

1

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Interr ial Application No
PCT/EP 98/02980

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0441719 A	14-08-1991	FR 2657894 A	09-08-1991
		FR 2663965 A	03-01-1992
		AT 135967 T	15-04-1996
		CA 2033797 A	07-08-1991
		DE 69118225 D	02-05-1996
		DE 69118225 T	05-09-1996
		US 5213874 A	25-05-1993
EP 0174792 A	19-03-1986	JP 1973544 C	27-09-1995
		JP 61064447 A	02-04-1986
		JP 1727717 C	19-01-1993
		JP 4014628 B	13-03-1992
		JP 61066646 A	05-04-1986
		US 4656080 A	07-04-1987

DERWENT-ACC-NO: 1977-85806Y

DERWENT-WEEK: 197748

TITLE: Plastic coated metal wire mfr. - by coating wire with primer, curing and extruding thermoplastic resin about wire

PATENT-ASSIGNEE: DAISEL LTD[DAIL]

PRIORITY-DATA: 1976JP-0043348 (April 16, 1976)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP 52126465 A	October 24, 1977	N/A	000	N/A

INT-CL (IPC): B05D007/14, B29F003/10

ABSTRACTED-PUB-NO: JP 52126465A

BASIC-ABSTRACT:

Process for coating metal wire with thermoplastic resin comprises coating the wire with primer contg. organic solvent, passing the wire through a high-frequency induction heater to cure the primer, and then extruding thermoplastic resin about the wire. Wire is coated with polyamide at a high speed >=50 m/min. to obtain higher corrosion-and friction resistances. The resulting coated wire is used as submerged wire for fishing.

The primer may be PVC, epoxy-phenol, polybutadiene dissolved in organic solvent. Wire is passed through trichloroethane, primer, a

heater, a solvent
recollector, an extruder, a cooling tank and a winder.

TITLE-TERMS: PLASTIC COATING METAL WIRE MANUFACTURE COATING WIRE PRIME CURE
EXTRUDE THERMOPLASTIC RESIN WIRE

DERWENT-CLASS: A32 P42

CPI-CODES: A05-F01E; A08-M01B; A11-B05B; A12-B04B; A12-F01;

POLYMER-MULTIPUNCH-CODES-AND-KEY-SERIALS:
Multipunch Codes: 010 03- 061 062 063 141 231 303 311 332 352 359 398 415 431
443 444 473 477 597 599 600 611 647 663 688 720 010 03- 140 141 226 231 303 311
332 336 352 359 398 415 431 443 444 473 477 597 599 600 611 647 663 688 720 010
03- 117 122 141 231 303 311 332 352 359 398 415 431 443 444 473 477 597 599 600
611 647 663 688 720

⑲日本国特許庁　　⑪特許出願公開

公開特許公報　　昭52—126465

⑤1Int. Cl².	識別記号	⑤2日本分類	庁内整理番号	④3公開　昭和52年(1977)10月24日
B 29 F 3/10		25(5) E 3	7327—37	
B 05 D 7/14		24(7) B 4	7006—37	発明の数　1
				審査請求　未請求

（全 8 頁）

⑤4熱可塑性樹脂被覆金属線の製造法

⑦1特　　願　昭51—43348
⑦2出　　願　昭51(1976) 4 月16日
⑦2発 明 者　竹内正
堺市浜寺南町 2 丁140番 1 号
同　　生田達
神戸市東灘区本山町岡本高井91番地
⑦2発 明 者　仲田勝晴
堺市浅香山町 3 丁 3 番23号
⑦1出 願 人　ダイセル株式会社
堺市鉄砲町 1 番地
⑦4代 理 人　弁理士　古谷馨

明　細　書

1. 発明の名称

熱可塑性樹脂被覆金属線の製造法

2. 特許請求の範囲

1　金属線に有機溶剤を含むプライマーを均一に塗布し、高周波誘導加熱装置により該金属線を加熱する事により該プライマーを硬化焼付け、続いてその上に熱可塑性樹脂を押出被覆する連続的な熱可塑性樹脂被覆金属線の製造法。

2　金属として鉄線を用いることを特徴とする特許請求の範囲オ 1 項記載の熱可塑性樹脂被覆金属線の製造法。

3　高周波誘導加熱装置により金属線を加熱する際にプライマー中の溶剤を回収することを特徴とする特許請求の範囲オ 1 項記載の熱可塑性樹脂被覆金属線の製造法。

4　線速 5 0 ㍍／分以上で連続的に行うことを特徴とする特許請求の範囲オ 1 項記載の熱可塑性樹脂被覆金属線の製造法。

5　熱可塑性樹脂としてポリアミドを用いることを特徴とする特許請求の範囲オ 1 項記載の熱可塑性樹脂被覆金属線の製造法。

6　プライマー溶液を 5 0 ～ 1 0 0 ミクロン厚に塗布することを特徴とする特許請求の範囲オ 1 項記載の熱可塑性樹脂被覆金属線の製造法。

3. 発明の詳細な説明

本発明は耐蝕性、耐摩耗性に特に優れ、他の諸物性においても劣らない熱可塑性樹脂を金属ワイヤーに高速度で確実に連続塗布し、海底電線、鎧装ワイヤー、養魚用ワイヤー等として、優れた効果を発揮する熱可塑性樹脂被覆金属線の製造法に関するものである。

今日、軟質又は中硬質塩化ビニル被覆鉄線に代表される熱可塑性樹脂被覆鉄線は広範囲に渡つて多量に使用されているが海洋開発の進行と共に例えば海中フエンス、養魚用生け す、海底電線鎧装鉄線、海上橋梁用各種ワイヤー類など海中もしくは海上構築物分野での需要も増大の

一途をたどつている。

これらの用途においては通常の陸上使用に際しては遭遇し得ない過酷な自然条件下にさらされるものであり従来にはるかにまさる防食機能、防食寿命が皮膜に強く要望されて来ている。

この防食性能改善策とには金属の腐食が水及び酸素の存在の下で進行するものであるから、まずは鉄線を水及び酸素から隔離する事が必要であるがこの目的を確実に達成する為には皮膜が機械強度に劣り脆弱である為に皮膜が容易に傷つけられ水が皮膜内に侵入する様な事があつてはならない。この見地から皮膜に機械強度に優れる樹脂、例えばポリアミド樹脂等のエンジニアリングプラスチックスが今後大巾に採用されて行く事が特に期待される。

また、被覆法の点から考えれば皮膜からピンホール等の欠陥部を完全に排除する事が必要であり、この見地からすれば近年粉体塗装法によるワイヤーの被覆が種々検討されてはいるが現段階ではピンホールが確実に排除出来る見通しはなく、かゝる分野に使用されるワイヤーの被覆にあつてはやはり皮膜に万全を期する為押出被覆法を選択すべきである。

しかしながら押出被覆法であつても更に次の様な対策が不可欠である。即ち、通常金属被覆に用い得る熱可塑性樹脂はある程度の酸素及び水を透過させ透過した酸素及び水が消費される限りこれを補填しつゞける能力をもつ。一方、金属の錆、腐食は金属の合金組成或いは結晶組織の相違、ひずみの存在、不純物の介在等による不均一性及び環境の不均一によつて金属表面に電位差を生じ局部電流が流れる事に起因する電気化学的機構に従うものであり極めて微量の水、酸素が存在すればこの反応が進行し例え皮膜にピンホールが絶無であつても熱可塑性樹脂でたゞ金属表面を覆うだけでは事実上水、酸素の遮断効果によつて腐食の進行を防止する事は出来ない。

従つて、この対策としては、金属表面に発生する局部電流の両極間に絶縁帯をもうける事が不可欠であるが樹脂皮膜を同時に長期間この絶縁体として働かしめる事はその金属に対する接着性の点において極めて困難である。近年、金属に対する高い接着性を有する熱可塑性樹脂として例えばアイオノマー、ＥＶＡ、変性ポリエチレン、変性ポリアミド等が市販され、これ等をプライマーを用いずに防食被覆に利用する試みが種々なされているがどれらはいずれも高い初期接着強度は示し得ても水中に浸漬されると極めて短期間の中にその接着性を失い場合によつては加水分解等によつて生じたイオンの為にかえつて腐食の速度が上昇する事がある。かゝる見地から真に防食性にすぐれた防食皮膜を金属表面上に形成させる為には皮膜樹脂と金属表面の間に水と金属以上に高い凝集力を以て金属表面に接着し且つ耐水性、電気絶縁性に優れる樹脂或いは防食剤を一層プライマーとして介在せしめる事が不可欠である。

しかしながら、このプライマーとなり得る樹脂あるいは防食剤は通常有機溶剤を５０％以上場合によつては９０％以上も含む溶液としなければワイヤーに塗布する事が出来ずしかも更に焼付けなければその効果を十分発揮し得ないものが殆んどである。

しかるにかゝるワイヤーの押出被覆に際しては少なくとも分速５０ｍ以上の被覆速度が確保されない場合には製造コストが合わず又市場の需要にも応じきれるものではないが、かゝる速度で連続的にプライマーをワイヤーに塗布し、これを乾燥せしめさらに焼付ける事は甚だむづかしい事である。特に、プライマー塗布後の乾燥工程で発生する溶剤蒸気は火災、作業環境の悪化、大気汚染の直接原因となり高速運転になればなる程この問題は深刻化する。前出のアイオノマー、ＥＶＡ等金属に対して高い接着性を示すとされる樹脂がこの分野で検討されるのもこの溶剤を多量に含むプライマーの取り扱いを避けん為のものであると言える。

以上のように耐防食性を要求される被覆ワイヤーは金属の芯線との密着性が必要で現在押出

コーティングなどによるものでは芯線のワイヤーと完全な密着性を有した製品は市場に見当らない。通常塩ビのゾルコーティングによるものは見かけるが生産性の点で問題が多い。また、軟質又は中硬質塩化ビニル樹脂を押出しコーティングした製品も機械的特性において不十分であり、よつて被覆膜が破損した後、芯線の腐食、断線を生ずる。また、粉体塗料を用いて、被複ワイヤーを製造することも行なわれていた（特開昭51－7044）が、これらの方法では、接着強度等の特性においてまだ十分な製品が得られず、その上工業化に際して、十分な製造速度を得ることができなかつた。粉体塗装の場合、製品の被覆にピンホールの発生を完全に防止することができず、上記の需要を決して満足させるものではなかつた。

本発明者は、現段階ではプライマーの使用がワイヤーの防食性能向上の為には不可欠である事、しかしながら製造工程上これを消化する事は甚だ困難であるとの相対立する問題を解決すべく鋭意検討を重ねた結果ワイヤーに必要最だけのプライマーを塗布した後直ちに、これを高周波誘導加熱装置によりプライマーを乾燥すると同時にワイヤーに焼付け且つ同時に高周波誘導加熱装置の加熱コイル部で溶剤を回収する事により、極めて安全に高速で運転が可能な押出被覆工程を完成する事が出来た。この工程について更に詳細に説明する。

本発明に使用する被覆樹脂としては、熱可塑性樹脂が用いられ、特にポリアミドが好ましい。他に塩化ビニル樹脂、ポリエチレンも使用できる。金属線と被複樹脂との接着剤（プライマー）としては、本発明においては何ら限定されるものではないが、例えば、塩酢ビ系、エポキシフエノール系、ポリブタジエン等の樹脂を有機溶剤と共に用いる。このように有機溶媒を大量に含むプライマーを用いる工程においては、プライマーの硬化処理において溶剤が大量に揮発し、この蒸気を回収することが、作業現場の環境保全、公害対策、火災防止等に不可欠であり、この要求は、電気炉、赤外又は遠赤外加熱等の外部加熱方式では満足させることができなかつた。本発明においては、金属線の内部加熱方式として高周波誘導加熱装置を用いるものであり、この方法は瞬間加熱の為、加熱炉長（コイル長）は短縮され、従つて溶媒の発生場所を局部に限定でき、しかも発熱部を有しない為、火災に対して安全である。本発明の高周波加熱において、加熱コイルを長くし、冷却水の温度を十分に低く保つことによつて加熱コイルを同時に回収用コンデンサーとして使用することができる。この際、コイルにフードを設けるとさらに効果的である。高周波加熱法は、外部加熱に比較して上記の利点の外に、加熱効率が良い（30％上昇）加熱温度の制御が容易、加熱スペースが極めて小さい等の利点を有する。高周波誘導加熱は周知の如く、鉄材の内部加熱に基くものでありその効率は高く極めて急速な加熱が可能である。プライマーの乾燥、焼付け温度はプライマーの種類に応じて150～400℃で実施されるが、この時本加熱方法によれば室温から所定温度に達するまでの所要時間は1/10～1/15秒程度であり、瞬間的に溶剤が蒸発する為溶剤蒸気の発生場所は加熱コイル部に集中する事となる。従つて加熱コイル中の冷却水温度を低く保てばコイルが溶剤蒸気のコンデンサーとして働き発生する蒸気の多くが液化され溶剤としての回収が可能となる。特にこの時コイルに円筒上の簡単なフードをかける事により回収効率を著しく上昇させる事が出来、溶剤蒸気を周辺に逸散させる事を防ぐ事が出来る。更にこの状況を完璧なものとする為には加熱コイルの次に1～2m長の円筒上の吸引ダクトをもうけこれにワイヤーを通過させながらワイヤーがコイル部からつれてくる少量の溶剤蒸気を除去すればよい。この装置はプライマーによつてはコイル通過後に若干の煙を発生するものがあるのでこの煙の除去にも極めて効果的である。かゝる方式による溶剤の回収は、高周波誘導加熱装置自体に発火源となる発熱部がない事から、通気炉、赤外線炉

に比べ遙かに安全であり事実上火災を心配する必要はなく、更に溶剤の回収率が高い為現場作業環境の保全にも極めて効果的である。また、本装置を用いる事によつて溶剤蒸気の発生場所をコイル部に集中させる事が出来るので溶剤回収の為の装置も極めて小型となり、むしろ発明者の経験ではコイルのターン数を出来る限り増す、コイルのピッチをコイルを形成するチューブの外径以下とする等の簡単なコイルの設計、冷却水の温度を２０℃好ましくは１０℃以下に保つ等の方法によつて事実上溶剤回収装置を銘打つべきものは特に必要なかつたと言える。

また、一般にプライマー塗布、焼付工程を押出被覆ラインに組み込んだ場合ラインの総長さが著しく長くなるとされているが、これは熱伝導に基く外部加熱方式をもつてプライマーの焼付けを行うとするためであり、本方式を採用すればラインの長さは数メートル伸びるにすぎない。但し、本方式の如く高周波誘導加熱方式によつてプライマーの焼付けを行う為には、次の様な対策を取る事が好ましい。即ち、本方式では高周波誘導加熱により前述の如く瞬間的に溶剤を揮発させる為にプライマーが発泡し、この発泡状態のままプライマーが焼付けられた場合には後の押出被覆工程において気泡を皮膜とプライマーの間にかみ込ませる結果となり被覆ワイヤーの防食性能を低下させる原因となりやすく又、外観的にも凹凸が認められる事があり好ましいものではない。この対策としてはプライマーの塗布量を出来る限り小さくする事が最も効果的であり、プライマー塗布工程において過剰のプライマーを塗布する事をさけ必要最少量だけのプライマーを塗布する様にしなければならない。通常焼付け後のこの種のプライマーの肉厚は５～３０μ程度で十分その効果を発揮し得るものであり、従つて固形分１０～５０％の溶液を塗布するとなれば溶液塗布肉厚は３００μ以下、本発明者がその効果を認めたプライマーの多くは必要塗布肉厚は５０～１００μでこの程度の塗布量であれば発泡等による問題は生じなかつた。従つてプライマー塗布に際して、この程度の肉厚でプライマーを均一に塗布する為の方策が必要であるが、この点についてはプライマーをワイヤーにスプレー塗布するなど比較的簡単な方法でこの目的を達する事が出来る。

かくして必要量だけのプライマーが均一に塗布されたワイヤーは前述の加熱コイルに導かれプライマーの乾燥、焼付けを受けた後押出機クロスヘッドダイスに導入されて熱可塑性樹脂が被覆されるが、この工程によればダイスに導入されるワイヤーはまだ十分高温に保たれている為プライマー層に対する樹脂の接着が極めて強固なものとなり皮膜の防食性能向上に大きな効果を発揮するものである。

但し、加熱コイルを出たワイヤーを直接ダイスに導入する事に不都合があつたり又別の工程を経由する必要がある時には高周波誘導加熱によるプライマーの乾燥、焼付け工程と押出し被覆工程を分離独立させる事はいつこうに構わない。例えば線径１㎜乃至はそれ以下のワイヤー被覆に際してはワイヤーの放冷による温度降下が大きく場合によつてはプライマーの乾燥は出来ても焼付けが不十分となる事がある。この様な場合にはむしろ押出被覆工程を分離し加熱コイル後に焼付け工程をもうける方が好ましい。

以上押出し被覆工程にプライマーの塗布、乾燥、焼付け工程を組み込みそのラインを高速で且つ安全に運転する為に高周波誘導加熱装置を使用し連続的にプライマーを焼付けると同時に溶剤蒸気を液化せしめこれを回収する事によつてその目的を達する事が出来る事を説明したが、逆に加熱コイル部で溶剤蒸気を液化させる事に不都合があり、蒸気のまま回収し、しかる後に液化或いは焼却処分に付したい等の場合には加熱コイルに温水に循環させればよく、溶剤組成によつて温水温度を適宜調節する事により極めて効率よく溶剤を蒸気のまま回収する事が出来る。又、ワイヤーの材質、線径、メッキの有無についても特に限定するものではないがこのプロセスが高周波誘導加熱を不可欠要素としている

関係上ワイヤーの材質としては高周波誘導加熱が可能な材質に限られ、操作上の点から線径としては1～10㎜程度のものが本プロセスに適している。メッキについては亜鉛メッキ線を使用する事が防食性の点から更に好ましいと言えるが、この場合には適用出来るプライマーが少ない事及びメッキ層を守ると云う点からワイヤーの加熱温度は高くとも300℃以下が好ましい等の制限が実施に際して加えられる。

本発明による被覆金属ワイヤーの製造法は工業的に十分に適応できるもので、少なくとも毎分50m以上の線速で生産できる。このような高速度の生産は、プライマーの硬化（焼付け）と被覆樹脂の押出しの各工程を可及的に近接して行うことによつてさらに生産速度を上昇させることができ、熱損失も少なくなる。脱脂した金属ワイヤーにプライマーを塗布し、直後に高周波誘導加熱装置によつて加熱する。通常、プライマーの焼付け温度は、被覆樹脂を押出すに必要な金属ワイヤーの予備加熱温度よりも高いので、加熱コイルと押出し機のダイスとの間の距離は、この間の冷却速度に基づいて適切に設定されるのである。このような温度制御によつて金属ワイヤーと被覆樹脂間に高い接着強度をもたらす。

次に本発明による製造工程の具体例を実施例と共に説明する。

実　施　例　1

線径3.2φの硬鋼線にポリアミド12樹脂（ダイセルヒユルス社製、ダイアミドL 1901）を肉厚300μ線速70m/分で押出被覆した。この時用いたプライマーはポリブタジエン系プライマー（ダイセル製P-1-Dプライマー）で固形分12.7%溶剤はトリクロルエタンであつた。第1図に被覆工程図を示した。

サプライスタンド(1)より引き出されたワイヤー(2)はテンションローラー(3)を経てローラー式矯正機(4)にて矯正されトリクレン脱脂槽(5)で脱脂される。脱脂されたワイヤーは振動防止ローラー(6)を経てプライマー塗布装置(7)に入り所定量のプライマーがスプレーされる。しかる後ワイヤーは直ちに出力50KWの高周波誘導加熱装置の加熱コイル(8)に導かれ550℃に加熱されたがこの時発泡は認められなかつた。この時用いた加熱コイルは内径5㎜外径5㎜の銅チューブからなり表面はガラス繊維で絶縁され、コイル内径は10㎜、ターン数18ターン、コイル長さ150㎜コイル中を循環させた冷却水は10℃であつた。この条件下でのトリクロルエタンの回収率は68%であつた。このコイルにポリアミド製0.5㎜肉厚のシートで作成したフードを取り付けた所トリクロルエタンの回収率は88%となつた。

第2図にこのフードのスケッチを示した。(9)がポリアミド製フードで下面だけが太鼓バラとなつており、その底の部分に液化した溶剤が集められるチューブ(10)が取り付けてある。(11)は加熱コイル(12)は加熱コイル端子である。フードの長さはコイル長さの2～4倍が適当である。加熱コイルを出たワイヤーは振動防止用テフロン製ローラー(13)を経て、吸引ダクト(14)を通過する。この吸引ダクトは口径1/2インチ長さ2mのステンレスパイプからなりゴムホースで吸引機に連結されている。この吸引ダクトで吸引した溶剤蒸気をコールドトラップを用いて回収した所回収率は7%であつた。引き続いて押出し機のクロスヘッドダイス(15)に導入されたワイヤーは通常のワイヤー被覆方式に基いてポリアミド12樹脂が被覆され直ちに冷却槽(16)で水冷された後キャタピラー引取り機(17)によつて引き取られ巻き取り機(18)によりドラムに巻かれて行く。

かくして得られた被覆ワイヤーの皮膜性能測定すべく後に示した方法により接着強度を測定した所43kgの接着強度が得られ60℃で3%食塩水に20日間浸漬した後の接着強度にも低下は認められず皮膜内面での錆の発生皮膜端末からの腐食の進行も殆んど認められなかつた。

実　施　例　2

実施例1と同様のプロセスにて3.2φの硬鋼

鉄線にポリアミド12樹脂を肉厚３００μ線速７０m/分で押し出し被覆した。

用いたプライマーはエポキシフエノール系プライマー（特願昭５０－１２１８９６に開示されたプライマー）で、固型分２０％、溶剤はエチルセロソルブトルエン、メチルイソブチルケトン等重量混合物であつた。

加熱コイルによる加熱温度は２７０℃、加熱コイル冷却水は１０℃であつた。溶剤の回収率はフードを取り付けない状態で７８％、フードを付けた場合で９５％、吸引ダクトでの回収率は４％であつた。

かくして得られた被覆ワイヤーの皮膜性能を実施例１と同様にして測定した所３８kgの接着強度が得られ、３％食塩水に６０℃で２０日間浸漬した後にも接着強度の低下は認められず皮膜内での錆の発生、皮膜端末からの腐食の進行もほとんど認められなかつた。

なお、接着強度は以下記載の方法によつて測定された。

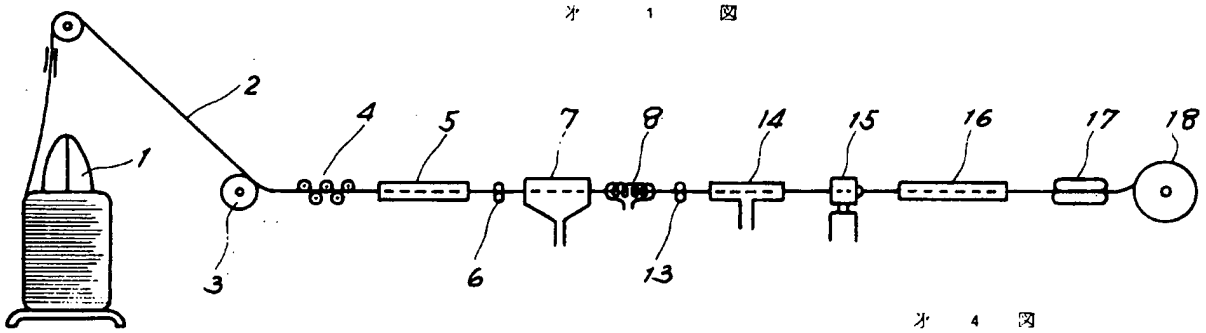
被覆金属線(31)を１５cmに切断しオ３図に示した如くに皮膜(32)を一部を除いて剥離し、口径3.2mmの穴(34)をもつ金属性治具(33)にオ４図の如くにテストピース(35)を差し込み、万能引張試験機（三井石油化学製、アドマーNM 050）により上部より１０mm/分の速度で圧縮加重(36)を加え、皮膜が剥離する時の実荷重（平均）を求めた。

4. 図面の簡単な説明

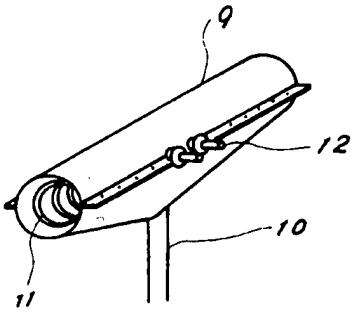
オ１図は本発明による製造工程であり、オ２図は高周波誘導加熱装置の一実施例を示し、オ３～４図は接着強度測定を説明するものである。

特許出願人
ダイセル株式会社
代理人
古谷　馨

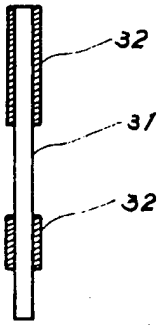
オ　１　図



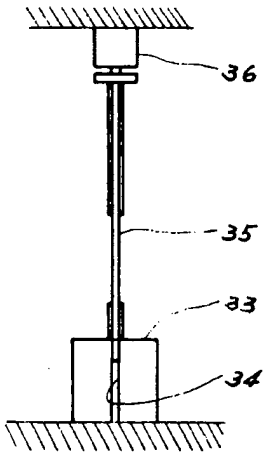
オ　２　図



オ　３　図



オ　４　図



手 続 補 正 書（自発）

昭和５１年[redacted]月２日

特許庁長官 片 山 石 郎 殿

1. 事件の表示

特願昭５１－４３５４８号

2. 発明の名称

熱可塑性樹脂被覆金属線の製造法

3. 補正をする者

事件との関係 特許出願人

(290)ダ イ セ ル 株 式 会 社

4. 代 理 人

東京都中央区日本橋横山町1の3中井ビル

(6589)弁理士 古 谷 馨

5. 補正の対象

明細書の特許請求の範囲及び発明の詳細な説明の欄

6. 補正の内容

(1) 特許請求の範囲を別紙の如く補正

(1) 才２頁１２行「線、艤装ワイヤー、餐魚用ワイヤー等」を「線艤装ワイヤー、餐魚生け す用ワイヤー等」と訂正

(1) 才５頁６行「改善策とには」を「改善策としては」と訂正

(1) 才５頁１８行「この見地からすれば」を削除

(1) 才４頁１６行「事実上水、」を「事実上水および」と訂正

(1) 才５頁１５行「水と金属以上に高い吸集力を以て」を削除

(1) 才５頁１６行「面に接着し」を「面に確実に接着し」と訂正

(1) 才５頁１９行「しかしながら、この」を以下の如く訂正

「しかしながら現在押出成形法により被覆を行い且つ耐水性にすぐれるプライマーを用いて皮膜を芯線に強固に接着した製品は市場に見らない。かゝる接着を前提とした成品が市場にこれまで提供されなかつた最大の理由は次の様なものであると考えられる。即ち、これらの」

(1) 才６頁３行「焼付け」の前に「塗布後これを」を挿入

(1) 才９頁５行～１４行「の方法は瞬間加熱の為、……（３０％上昇）、」を以下の如く訂正

「の方法は瞬間加熱の為、加熱炉長（コイル長）は著しく短縮され、従つて溶剤蒸気の発生場所を局部に限定でき、しかも装置自体の発火元となる発熱部を有しない為、火災に対して極めて安全である。更に重要な点は本発明の高周波加熱において、加熱コイルを長くし、冷却水の温度を十分に低く保つことによつて加熱コイルを同時に溶剤回収用コンデンサーとして使用することができる事である。この際、コイルをフードで覆うとさらに効果的である。高周波加熱法は、外部加熱に比較して上記の利点の外に、加熱効率が良い（３０％）、」

(1) 才１１頁１１行「装置を」を「装置と」と訂正

(1) 才１１頁１７行「行う」を「行おう」と訂正

(1) 才１２頁１９行「５０～１００μ」を「１０～１００μ」と訂正

(1) 才２０頁５行「（三井石油化学製、アドマー ＮＢ 050）」を削除

2　特許請求の範囲

1　金属線に有機溶剤を含むプライマーを均一に塗布し、高周波誘導加熱装置により該金属線を加熱する事により該プライマーを硬化焼付け、続いてその上に熱可塑性樹脂を押出被覆する連続的な熱可塑性樹脂被覆金属線の製造法。

2　金属として鉄線を用いることを特徴とする特許請求の範囲オ1項記載の熱可塑性樹脂被覆金属線の製造法。

3　高周波誘導加熱装置により金属線を加熱する際にプライマー中の溶剤を回収することを特徴とする特許請求の範囲オ1項記載の熱可塑性樹脂被覆金属線の製造法。

4　線速50m／分以上で連続的に行うことを特徴とする特許請求の範囲オ1項記載の熱可塑性樹脂被覆金属線の製造法。

5　熱可塑性樹脂としてポリアミドを用いることを特徴とする特許請求の範囲オ1項記載の熱可塑性樹脂被覆金属線の製造法。

6　プライマー溶液を10～100ミクロン厚に塗布することを特徴とする特許請求の範囲オ1項記載の熱可塑性樹脂被覆金属線の製造法。